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ABSTRACT

Recommendations for the improvement of the diesel engine and truck components of the Hawaii state certification examination for automobile and truck mechanics were solicited from 14 major private businesses repairing heavy tractor rigs and/or diesel engines on Oahu and a statewide sample of 21 trucking firms and other companies making extensive use of trucks. Personal interviews with managerial personnel at truck service and repair firms focused on: firm employees who had taken the diesel mechanics portion of the exam, its validity, preferences with regard to modification of the testing system, subject areas that should be emphasized in a new exam, willingness to participate in test development, preferences in relation to test administration, requirements for certification, the problem of English language fluency, and the weaknesses of the present testing system. Interviews with trucking firms solicited information on: the number of trucks in the firm's fleet and whether they were diesel or gasoline powered, desirability of mechanic certification, familiarity with the exam, adequacy of the gasoline engine examination and areas that needed improvement, truck frame, chassis, and diesel and gasoline engine suppliers, repair types and costs, complaints about repairs, and testing preferences. The survey report presents analyses of both surveys, recommendations, and the interview guides. (JP)

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DIESEL AND TRUCK CERTIFICATION NEEDS ASSESSMENT: TWO SURVEYS

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MAY, 1979

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DIESEL AND TRUCK CERTIFICATION NEEDS ASSESSMENT: TWO SURVEYS

William A. Broadbent
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Introduction

Since 1976 the Office of the State Director has been conducting certification examinations for automotive and truck mechanics. This program is necessary to achieve compliance with state law. In four years of testing, two things have become evident. For mechanics who deal primarily with automobiles and light trucks, the existing instruments and procedures appear to be relevant and fair. However, for those mechanics who work primarily on heavy truck chassis and large diesel engines, the existing tests seem to lack a degree of reality and do not really address the skills and knowledge these mechanics must possess.

Because of this, the Office of the State Director for Vocational Education, which is responsible for administering the certification examination, decided to suspend testing for those who work on heavy diesel engines and trucks and seek information as to a better approach for this group. In order to do this, it was decided to conduct two surveys. The first was directed at the service and repair industry itself. The second was directed at those firms served by this industry. This second sample was comprised of trucking firms and other firms and agencies that make extensive use of heavy trucks in their operation.

The rationale behind the surveys and the design employed is largely implicit in the content of the instruments (Refer to attachments "A" and "B").

What follows includes general information, a discussion of findings, and a set of recommendations derived from the two surveys.

Survey of Diesel and Truck
Service and Repair Firms

Overview

Most of the major private repair facilities servicing heavy tractor rigs and/or diesel engines on Oahu were visited. The manager in charge of diesel and/or truck repair was identified by phone and later interviewed in person. Managers of two firms on the outer islands were interviewed by phone. The phone interviews left a good deal to be desired but provided the most viable solution to the problems of distance and expense.

Findings

A list of respondents and the organizations they represent is provided in Table 1.

Very few mechanics employed by the firms surveyed had taken the diesel examination. In 14 of the firms canvassed, no employee had actually taken the examination (refer to Table 2). Most of the mechanics had taken advantage of the grandfather provision in the law to obtain certification.

Most service managers were, as a consequence, not familiar with the test (refer to Table 3). However, of those who had been exposed to the test, all felt it was invalid in its present form.

Two felt that the existing exam could be modified to satisfy the certification requirement (refer to Table 4). One expressed the opinion that the present test should be replaced with the Educational Testing Services' "National Institute for Automotive Service Excellence (NAISE)--Mechanic Certification Test." Another felt a practical exam was important even if it involved considerable expense. However, the great majority felt the best alternative would be a written test developed

TABLE 1

LIST OF PARTICIPANTS AND ORGANIZATIONS
PARTICIPATING IN THE INDUSTRY CANVASS

Respondent	Organization
Joe Montgomery	Aloha Chevrolet
Kenneth Kunisaki	Peterbilt
Joe Gobeil	Cummins Engines
Jeff Rebeck	Detroit Diesel
Ella Klein	General Equipment Company
Jack Gomes	Gomes Construction
Pete Greenwall	Kenworth
Jay Pilon	Pacific Machinery/Caterpillar
Shigi Wakmau	Hawaiian Equipment/International Harvester
Tomas Gima	Fleet Repair
Joe Gobeil*	Mack Trucks
Gary Yamada	International Truck and High Lift
Robert Yagami	Cutter Ford Truck Division
Wendell Late	Hawaiian Tractor and Trailer/ Peterbilt & Detroit Diesel
Nelson Umiamaka	Operating Engineers
Kerry Young	Hawaiian Repair and Service
Paul Onamura	Trucking Repair

*Mr. Gobeil changed jobs during the course of the study.

TABLE 2

RESPONDENTS WITH EMPLOYEES
WHO HAVE TAKEN THE DIESEL EXAM

Response	N	%
Have such employees	3	18
Have no such employees	14	82
Total	17	100*

TABLE 3

RESPONDENTS ASSESSMENT OF THE VALIDITY
OF THE PRESENT DIESEL ENGINES EXAMINATION

Response	N	%
Valid	0	0
Invalid	7	41
No opinion/no knowledge	10	59
Total	17	100

*All percentages are rounded.

TABLE 4

PREFERENCES FOR ACHIEVING
COMPLIANCE WITH THE LAW

Option	N	%
Modify the existing examination	2	12
Develop a new test using generic items prepared by manufacturers	12	70
Develop new written tests specific to each manufacturer	1	6
Develop new written and practical tests specific to each manufacturer	1	6
Ask the legislature to exempt diesel and truck mechanics from certification	0	0
Other: use ETS/NIASE Examination	1	6
Total	17	100

from items provided by major manufacturers. Most also volunteered the opinion that the engine test be separated from one dealing with body and chassis.

The various service managers were asked to assess the relative importance of nine different component areas that might be included in a certification examination for heavy road vehicles. "Brakes" and "diesel engines" received the highest priorities (refer to Table 5). "Transmission" and "suspension/alignment" were tied for third. "Gasoline engines" and "air conditioning" were reported as having the lowest priorities.

Nine of the service centers visited represented major manufacturers of either engines or tractor cab bodies. All manufacture representatives indicated that they would be willing to solicit test items from the companies they represent (refer to Table 6). The respondents were evenly divided when it came to the question of test administration. About half would like to designate a master mechanic to act as proctor and have the State Director for Vocational Education's staff monitor the test administration (refer to Table 7). In the view of this group, a master mechanic could answer any technical question and provide any necessary clarifications. An equal number would just as soon not have the industry get involved in this process. They would prefer to have the Office of the State Director for Vocational Education take all responsibility for giving the test.

Some representatives of major manufacturers felt there could be little difficulty in obtaining permission to use test items prepared for use in in-service company sponsored program. Others felt necessary approvals and clearance might require 60 days or more (refer to Table 8).

Most felt that "English language proficiency" would pose no problem for the mechanics who would need to take the test (refer to Table 9). However, several service managers were somewhat outspoken in their belief that language proficiency would be an important variable. They suggested that some talented mechanics with

TABLE 5

RESPONDENTS PERCEPTION OF THE RELATIVE IMPORTANCE OF THE VARIOUS COMPONENTS OF A NEW TRUCK AND/OR DIESEL EXAMINATION

Component	Little or no importance		N = 17		Great importance		Relative Ranking
	1	2	3	4	5	$\bar{X}$	
Transmission	0	12	29	24	35	3.82	3
Axle	0	12	35	29	24	3.64	5
Suspension/alignment	6	0	30	36	39	3.82	3
Brakes	0	0	6	0	94	4.88	1
Gasoline engines	12	41	17	24	6	2.70	8
Diesel engines	0	0	12	35	53	4.41	2
Drive train	0	6	29	41	24	3.41	7
Electrical	0	24	35	12	29	3.47	6
Air conditioning	70	6	6	12	6	1.76	9

TABLE 6

WILLINGNESS OF SERVICE CENTERS TO PROVIDE TEST ITEMS
FOR A REVISED DIESEL AND TRUCK CERTIFICATION EXAMINATION

Response	N	%
Would be willing	9	53
Would not be willing	0	0
Non-applicable	8	47
Total	17	100

TABLE 7

RESPONDENTS PREFERENCES RELATIVE PREFERENCES AS TO
HOW CERTIFICATION TEST SHOULD BE ADMINISTERED

	N	%
SDVE monitor	8	47
SDVE administer directly	8	47
Other	1	6
Total	17	100

TABLE 8

TIME REQUIRED BY HOME FIRM TO
FORWARD APPROPRIATE TEST ITEMS

Days Required	T
7 days	1
14 days	1
21 days	2
60 days	6
More than 60 days	7

TABLE 9

ENGLISH LANGUAGE PROFICIENCY
A PROBLEM IN VALID TEST ADMINISTRATION

Response	N	%
Yes	5	29
No	12	71
Total	17	100

poor language arts skills might be treated more fairly if the test were read to them.

The service managers were asked how many mechanics in their shops would need to take the test. The total estimate was 123. Most of the mechanics who work in the service centers, that represent major manufacturers, are members of the Operating Engineer's Union. The union representative who was interviewed said that there were about 50 people in his union that would need to take the test in order to obtain certification. However, he could not readily discriminate between those employed in service agencies and those working for construction firms or in the field without making an extensive review of his files. As a consequence, the numbers he reported were not added to the total. For this reason the figure is probably on the low side.

Table 10 reports the respondents perceptions as to the weaknesses of the existing examination.

TABLE 10

PERCEIVED WEAKNESSES

OF EXISTING EXAMINATION

	Incidence of Response
No opinion/no knowledge	9
Too theoretical	1
Invalid in terms of occupational realities	1
Comprehension a problem	1
Irrelevant	1
Confusing	1
Bias in test in that it presumes that there is only one proper tool and one way to do a given job	1
Invalid	1
Test was designed for small trucks... most diesel engines are found in heavy rigs with 12 or more gears...the technical language used to refer to the various types is different for the drive train and the like...a man can successfully and competently repair a heavy truck without knowing the precise term for each piece of equipment	1

Survey of the Trucking Industry and Firms Making Extensive Use of Trucks

Overview

In order to obtain additional perspective a survey of trucking firms and other companies making extensive use of trucks was conducted. Time and cost considerations limited the sample surveyed to 21 organizations chosen at random.

Findings

The firm operating the largest fleet had 52 vehicles in its fleet, the smallest 5. The firms interviewed had an estimated 175 diesel powered vehicles and 185 gasoline powered trucks and tractors. This resulted in a total of 360 (refer to Table 11). An overwhelming majority felt that certification of truck mechanics and those specialists who repair and overhaul diesel engines was desirable. Over 85 percent reported this as their sentiment (refer to Table 12).

Most of the firms service managers were not familiar with the existing examination used to certify automotive mechanics (refer to Table 13).

However, over three-fourths of the sample felt that an examination on gasoline fueled automotive engines could suffice for gasoline truck engines as well (refer to Table 14).

Because they were unfamiliar with present test for gasoline engines, about two-thirds of the respondents declined to offer suggestions as to how the present test for this component could be improved (refer to Table 15).

The tremendous variety and hetereogeneous nature of the various truck fleets is obvious from the information portrayed in Table 16. This hetereogeneity is apparently due to the fact that most Hawaiian firms buy

TABLE 11

FLEET SIZE OF
FIRMS INTERVIEWED

	Diesel Motive	Gasoline Motive	Total
Firm 1	2	2	4
Firm 2	0	15	15
Firm 3	0	16	16
Firm 4	2	2	4
Firm 5	13	18	31
Firm 6	12	0	12
Firm 7	8	17	25
Firm 8	2	8	10
Firm 9	21	0	21
Firm 10	20	13	33
Firm 11	3	7	10
Firm 12	6	3	9
Firm 13	12	40	52
Firm 14	33	0	33
Firm 15	4	0	4
Firm 16	2	1	3
Firm 17	4	16	20
Firm 18	6	5	11
Firm 19	2	18	20
Firm 20	15	0	15
Firm 21	8	4	12
Totals	175	185	360

TABLE 12

CERTIFICATION OF DIESEL AND TRUCK MECHANICS DESIRABLE

Response of Trucking Firm Representatives	N	%
Yes	18	85.7
No	2	9.5
Undecided	1	4.8
Total	21	100.0

TABLE 13

FAMILIARITY WITH EXISTING CERTIFICATION EXAMINATIONS

Response	N	%
Yes, familiar with existing examination	5	23.8
No, not familiar with existing examination	16	76.2
No response	0	0.0
Total	21	100.0

TABLE 14

OPINION AS TO WHETHER
EXISTING GASOLINE AUTOMOBILE
EXAM CAN SUFFICE FOR
GASOLINE TRUCKS

Response	N	%
Yes	16	76.2
No	2	9.5
Don't Know	3	14.3
Total	21	100.0

TABLE 15

CHANGES IF ANY NECESSARY
TO MAKE GASOLINE ENGINE EXAM
RELEVANT FOR TRUCKS

Response	N	%
No change, OK as is	8	38.1
Unfamiliar with test, can't comment	13	61.9
Total	21	100.0

TABLE 16

COMPANIES FROM WHICH
FIRMS INTERVIEWED PURCHASE
FRAMES AND CHASSIS

Heavy Truck User Firms in Sequence of Interview	Manufacturers
Firm 1	Kenworth International Chevrolet
Firm 2	GMC International Ford
Firm 3	Ford
Firm 4	Caterpillar
Firm 5	White International Peterbilt Chevrolet Kenworth
Firm 6	Kenworth Peterbilt
Firm 7	International
Firm 8	International
Firm 9	Peterbilt Mack International
Firm 10	Kenworth White Auto-Car Peterbilt International
Firm 11	International White GMC
Firm 12	Kenworth White Mack Peterbilt International

Firm 13	International Mack Ford White
Firm 14	MCI
Firm 15	Peterbilt White
Firm 16	Peterbilt International
Firm 17	Peterbilt Kenworth Ford GMC International Dodge
Firm 18	Peterbilt International GMC White Mack
Firm 19	International Gregory
Firm 20	Prevo
Firm 21	Kenworth Ford

used equipment. Many service managers reported that the companies, for which they work, lack the operating capital to buy new trucks in substantial numbers. Kenworth, Peterbilt and International are the manufacturers most predominantly represented in island fleets (refer to Table 16).

The diesel engines most commonly installed and maintained by firms with truck services are Cummins and Detroit Diesel (refer to Table 17).

International is the most popular gasoline engine (refer to Table 18). This may be due to the strong market position held by Hawaiian Equipment Company, International's representative in the islands.

The average annual repair cost varied considerably from one firm to another. This variance appears to be due to the age of the equipment and the sophistication of its design. The average estimated cost for all firms was $3,272 per truck (refer to Table 19). The highest cost were reported by petroleum handling firms. When asked about their apparently inordinate cost, representatives of these firms alluded to the public's perception of this type of truck as a "flamer." They consider it poor public relations for their vehicles to be seen at the side of the road in obvious need of repair.

Representatives of firms placing heavy reliance on trucks for the conduct of their operations were asked about their concerns about mechanical work done outside of their shops (refer to Table 20.) Over 85 percent felt that work done by mechanics at service centers they patronize posed no problems in the area of "safety." A slightly smaller percentage, 76.2 percent, had no concerns about the "quality of workmanship." All respondents said they had no worries in the area of "consumer protection." They did not feel that unnecessary work was being performed or that unneeded parts were being installed. This result is in marked contrast to the expressions of concern made by some of the representatives from the service industry

TABLE 17

COMPANIES FROM WHICH
FIRMS INTERVIEWED PURCHASE
DIESEL ENGINES

Heavy Truck User Firms in Sequence of Interview	Manufacturers
Firm 1	Cummins
Firm 2	None
Firm 3	None
Firm 4	International
Firm 5	Cummins Detroit Diesel
Firm 6	Cummins
Firm 7	Cummins
Firm 8	Cummins
Firm 9	Cummins
Firm 10	Cummins Detroit Diesel
Firm 11	Cummins
Firm 12	Cummins Detroit Diesel
Firm 13	Cummins Caterpillar International
Firm 14	Detroit Diesel
Firm 15	Cummins
Firm 16	Cummins
Firm 17	Cummins Detroit Diesel Caterpillar

Firm 18	Detroit Diesel Mack Caterpillar Cummins
Firm 19	Cummins Caterpillar
Firm 20	Detroit Diesel
Firm 21	Detroit Diesel

TABLE 18

COMPANIES FROM WHICH
FIRMS INTERVIEWED PURCHASE
GASOLINE ENGINES

Heavy Truck User Firms in Sequence of Interview	Manufacturers
Firm 1	Chevrolet International
Firm 2	GMC International Ford
Firm 3	Ford
Firm 4	International
Firm 5	Ford Chevrolet International
Firm 6	None
Firm 7	International Ford Cummins
Firm 8	International
Firm 9	International
Firm 10	International Ford Dodge
Firm 11	International GMC
Firm 12	International
Firm 13	International Ford
Firm 14	No Gasoline Engines
Firm 15	No Gasoline Engines

Firm 16	International
Firm 17	Ford GMC International Dodge
Firm 18	GM International
Firm 19	International
Firm 20	No Gasoline Engines
Firm 21	Ford

TABLE 19

APPROXIMATE AVERAGE
COST PER TRUCK, PER YEAR
FOR MECHANICAL, CHASSIS AND
BODY MAINTENANCE

Firms	Average Cost Per Truck	Number of Trucks
Firm 1	$1,000	6
Firm 2	$2,000	15
Firm 3	$1,000	16
Firm 4	$2,400	4
Firm 5	$2,000	31
Firm 6	$2,000	12
Firm 7	$5,700	25
Firm 8	$ 600	10
Firm 9	$5,000	21
Firm 10	$2,000	33
Firm 11	$2,500	10
Firm 12	$ 500	9
Firm 13	$1,800	52
Firm 14	$3,000	33
Firm 15	$14,000	4
Firm 16	$15,000*	3
Firm 17	$5,000	20
Firm 18	$15,000	11
Firm 19	$3,000	21
Firm 20	$12,000	15
Firm 21	$2,000	12
	$\bar{X}$ = $3,272	

* Adjusted down by field survey specialist

TABLE 20

COMPLAINTS ABOUT MECHANICAL REPAIRS RELATIVE TO RELEVANT CRITERIA

Criterion	Yes		No		No Opinion	
	N	H%	N	H%	N	H%
Safety	3	14.3	18	85.7	0	0.0
Quality of Workmanship	5	23.8	16	76.2	0	0.0
Consumer Protection Considerations (i.e. installations of unnecessary parts)	0	0.0	21	100.0	0	0.0
Excessive Repair Time	10	47.6	11	52.4	0	0.0

TABLE 21

NECESSARY TO HAVE SEPARATE EXAMS FOR DIESEL ENGINE AND TRUCK CHASSIS

Response	N	%
Yes	13	61.9
No	8	38.1
No Opinion	0	0.0
Total	21	100.0

who were canvassed in the first survey. The concern expressed by the manufacturer representative was primarily focused on small, independent service agencies.

However, almost half of the representatives of truck using firms did express concern about "excessive repair time." One of the factors contributing to this problem may involve the lack of a large parts inventory in the islands.

Respondents were asked what is the most typical type of repair they experience. The nature of the response varied widely and appeared to be largely related to the type of trucking service performed.

Firms whose business dealt largely with construction complained of drive train problems and difficulties with axles. For firms whose trucks were consigned predominately to highway use, these areas were not problems.

Bus companies complained of recurrent electrical difficulties and beverage delivery firms said air hoses ruptured because of the frequent stops and starts. However, there was no general pattern.

About two-thirds of the truckers interviewed felt that there should be separate tests for diesel engines and truck chassis (refer to Table 21).

The trucking industry representatives were also asked what should be done about the testing program in order to assure compliance with the law. Over 71 percent said that a written test using items provided by manufacturers would be the best solution (refer to Table 22). Two felt that the existing test could be modified sufficiently to serve the intended purpose. Three respondents wanted a practical test. They evidenced some concern about "college boy oriented" pencil and paper tests that make use of sophisticated terminology and involved syntax.

One thought the Legislature should exempt truck mechanics from a certification exam.

Truck operations companies were asked to rate the relative importance

TABLE 22

PREFERENCE OF HEAVY TRUCK USER FIRMS
FOR ACHIEVING COMPLIANCE WITH THE LAW

Option	N	%
Modify the existing examination	2	9.5
Develop a new test using generic items prepared by manufacturers	15	71.4
Develop new written tests specific to each manufacturer		
Develop new written and practical tests specific to each manufacturer	3	14.3
Ask the legislature to exempt diesel and truck mechanics from certification	1	4.8
Other	0	0.0
Total	21	100.0

of the same possible components of a "diesel" and/or "truck chassis" exam. The same set of items had been used in the truck service center survey.

As in the survey of service firms "brakes" were given the highest priority. Over 90 percent felt that this topic was of the greatest possible importance (refer to Table 23). "Diesel engines" received the second highest ranking. The mean assessment was 4.42. The relative importance of "electrical" varied considerably from the respondents in the trucking service industry and those firms who make heavy use of trucks in their operations. Those involved directly and primarily with mechanicical repair ranked "electrical" sixth but those operating trucks rated electrical third. The latter group provided an average rating of 4.28. The average ranking for "transmission" and "suspension/alignment" were fourth and fifth respectively. "Drive train" was sixth although, as previously mentioned, contractors and firms doing work which takes their trucks off the highway gave it very high ratings in terms of relative importance. "Gasoline engines" and "axle" were seventh and eighth and "air conditioning" was considered the least important and/or essential.

Comments and Other Considerations

Those firms who deal exclusively with hauling other companies goods gave a somewhat different impression than those who made use of their trucks to haul their own goods or materials. The firms which were involved only with trucking were extremely difficult to reach. The interviews were prolonged by numberous telephone interruptions. Most of the dispatchers and service managers seemed extremely preoccupied and obviously were concerned about keeping their trucks and drivers busy. Their greatest reported problem was "down time." They reported that they rarely challenged repair bills or questioned the quality of work performed.

The companies, which simply made extensive use of trucks in their operations, seemed to operate in a more controlled and relaxed atmosphere.

TABLE 23

RESPONDENTS PERCEPTION OF THE RELATIVE IMPORTANCE OF THE VARIOUS COMPONENTS OF A NEW TRUCK AND/OR DIESEL EXAMINATION

Component	NA	Little or no importance 1	2	N=21 3	4	Great importance 5	X	Relative Ranking
Transmission	0.0	0.0	4.8	28.6	33.3	33.3	3.95	4
Axle	0.0	9.5	4.8	33.3	38.1	14.3	3.42	8
Suspension/alignment	0.0	4.8	4.8	23.8	33.3	33.3	3.85	5
Brake	0.0	0.0	4.8	4.8	0.0	90.5	4.76	1
Gasoline Engines	4.8	0.0	4.8	33.3	38.1	19.0	3.75	7
Diesel Engines	0.0	4.8	4.8	4.8	14.3	71.3	4.42	2
Drive Train	0.0	4.8	4.8	28.6	28.6	33.3	3.81	6
Electrical	0.0	0.0	0.0	33.3	28.6	42.9	4.28	3
Air Conditioning	0.0	42.9	28.6	23.8	4.8	0.0	1.90	9

The managers of this second group were also concerned about down time. However, they frequently had a mechanic who supervised minor repairs and inspected completed work. Most of those contacted who were operators of truck fleets did not share the apprehension regarding the safety and the consumer protection that many of the manufacturers representatives expressed in the first survey.

Summary

Both service centers which employ truck and diesel mechanics and the firms which use their services feel that some kind of diesel and truck chassis certification examinations is desirable. Most of those engaged in the repair business and those operating trucks are of the opinion that the best type of examination would incorporate items taken from preservice and in-service instructional materials developed by manufacturers.

Because most of the truck fleets in Hawaii are purchased as used equipment, the types of chassis and engines in their fleets is varied. Most mechanics must, of necessity, work on a variety of types of equipment. As a consequence it would seem reasonable that any exam be as generic as possible.

Some industry representatives felt that a practical exam be included as well. However, the cost in terms of equipment alone would appear to preclude this option. Many people in the industry urged that the written test not be "college boy" oriented, require a sophisticated vocabulary, or involve a lot of recall of tolerances and other measurements.

Recommendations

1. The present test for diesel should probably be discarded. Of the service managers expressing a view on the existing examination, the opinion was generally negative and in some cases this "disenchantment" was expressed in emphatic terms. Much of the criticism is possibly unwarranted. However, the credibility of the present test has probably been hopelessly eroded.
2. Any revised test should probably be divided with three components.
   a. There should be a test devoted exclusively to diesel engines. Some companies, such as Pacific Machinery do nothing but repair and rebuild Caterpillar engines. They do not perform work on truck bodies or chassis. Their mechanics would only have to take the examination that deals with engines.

      Most of the service managers agree that gasoline engines in trucks are enough alike those in automobiles that the automotive exam can be used to meet the need in this area.

      Most manufacturer representatives also report a steady trend to diesel. No separate test for truck gasoline engines seems necessary.
   b. There should be a separate test that deals with truck chassis and body. Some firms, like that which represents Kenworth, do not as a rule work on engines. Their mechanics occasionally make some minor adjustments to the engines, but work involving any significant expertise in this area is referred to other firms.
   c. In order to be totally equitable, a separate exam for bus chassis should probably be developed. General Equipment Company works primarily on buses. Earlier interviews for another study with Hawaii Scenic Tours and Gomes Bus Company confirm the assertion of the owner of General Equipment that the mechanical construction of buses is significantly different from that of trucks.

3. The certification examinations for diesel engines, truck chassis, and bus chassis should all be written. No "practical/performance" exam seems feasible. Diesel engines all are built essentially the same way. However, each of the manufacturers do design their engines with one or more idiosyncrasies. The fuel injection systems in particular frequently vary in design.

   A new engine costs about $15,000. To buy an engine from each of the major manufacturers would be difficult to justify in terms of the possible benefits to be derived from a practical/performance exam.

   The cost factor would also be a problem in the areas of truck and bus chassis.

4. The examination should probably be developed from items provided by the major manufacturers. A blue ribbon panel of industry representatives could eliminate items which were specifically oriented toward the particular product of any one company. A psychometrist could reword and reorganize the surviving pool of items to assure uniformity. The number of items on any given area covered might be made proportionate to the significance attributed to that component by the respondents in the two surveys conducted.

5. The administration of the exams might best be proctored by a representative from this office and a master mechanic. Our representative could certify that the exam was fairly and correctly administered. The master mechanic would be available to anwer any questions of a technical nature.

University of Hawaii

Office of the State Director for Vocational Education

Diesel Mechanics Certification Survey

Overview

With the passage of Section 4378-23 of the Revised Statutes of the State of Hawaii, certification of automobile and truck mechanics became mandatory. Responsibility for development of the test was given to a consultant firm. The test has been administered to thousands of mechanics successfully. However, there have been problems with one component; this is the section on diesel. Because of concerns about the validity of this particular subcomponent and the relevance of other parts of the test for mechanics who work on trucks weighing 10,000 pounds or more, testing for this group has been suspended. Some acceptable alternative must be found. The purpose of this survey is to seek consensus on such an alternative.

1. Name of person interviewed: _____

2. Organizational affiliation: _____

3. Have you or any of your employees taken the diesel mechanics portion of the automotive certification exam?

   _____ a. yes

   _____ b. no

4. Do you feel the present examination in the area of diesel engines is valid?

   _____ a. yes

   _____ b. no

5. If some modification in the present system of testing diesel/truck mechanics is necessary which of the following options would you prefer?

   _____ a. modify the existing examination

   _____ b. develop a new test using generic items derived from items prepared by major manufacturers

   _____ c. develop new tests for each major manufacturing firm from items provided by these firms

   _____ d. develop both a written and practical/performance test which is generic in nature from items provided by dealers and service centers

   _____ e. ask the Legislature to exempt diesel/truck mechanics from certification

_____ f. other _____

_____

_____

6. If a new written examination(s) is to be developed what should be the relative emphasis on the following components?

	little or no importance				great importance
(1) transmission	1	2	3	4	5
(2) axle	1	2	3	4	5
(3) suspension/alignment	1	2	3	4	5
(4) brakes	1	2	3	4	5
(5) gasoline engines	1	2	3	4	5
(6) diesel engines	1	2	3	4	5
(7) drive train	1	2	3	4	5
(8) electrical	1	2	3	4	5
(9) air conditioning	1	2	3	4	5

7. Would you and your manufacturer be willing to contribute as many as 150 items, of a multiple choice variety, for inclusion in a written test?

_____ a. yes

_____ b. no

8. From the standpoint of test administration which of the following options would you prefer?

_____ a. administer the test yourself with SDVE monitoring

_____ b. have SDVE administer the test

9. If you and/or your company are able to contribute test items what is the latest date you could make such items available?

_____

10. How many mechanics in your organization require certification?

_____

11. Is English language proficiency a possible problem with any of the prospective mechanics who would take a revised examination?

_____

12. What in your view are the principal weaknesses of the present examination that should be remedied in any revised examination?

_____

_____

☐ no opinion

University of Hawaii

Attachment B
Office of the State Director
for Vocational Education

TRUCKING COMPANY SURVEY

Prologue

With the passage of Section 4378-23 of the Revised Statutes of the State of Hawaii, certification of automobile and truck mechanics became mandatory. Responsibility for development of appropriate tests was given to a mainland consultant having expertise in this area. Most of the tests have been administered to thousands of mechanics successfully. However, there have been problems in two areas. Some mechanics feel that repair work on truck chassis and the systems contained therein is signficantly different when the vehicle weighs 10,000 pounds or more. Other mechanics find the diesel engines test too difficult and/or confusing. The administration of the diesel test has been temporarily suspended. However, the testing in this area must be resumed or some alternative found if compliance with the law is to be assured. The Office of the State Director for Vocational Education has surveyed the service industry to obtain their views and preferences in this regards. We are now canvassing those firms who are served by the truck and diesel repair sales/service centers. That is the purpose of this interview.

1. How many truck, of over 10,000 pounds road weight, do you have in your fleet?

   _____

2. Of this number, how many are:

   a. _____ diesel powered

   b. _____ gasoline powered

3. Do you feel certification of diesel and truck mechanics is desirable?

   a. _____ Yes

   b. _____ No

   c. _____ Undecided

4. Are you at all familiar with the existing written test for gasoline engines?

   a. _____ Yes

   b. _____ No

5. In your view, can the gasoline engine examination present suffice for mechanics who work on gasoline truck engines?

   a. _____ Yes

   b. _____ No

   c. _____ Don't know

6. If your answer is no, what would be the changes needed to make a gasoline engine exam relevant to trucks?

_____

_____

_____

a. _____ Non-applicable

7. From what companies do you purchase truck frames and chassis?

a. _____

b. _____

c. _____

d. _____

(CODE)

7a. _____ One company only

7b. _____ Two or more companies

8. From what companies do you purchase your diesel engines?

a. _____

b. _____

c. _____

d. _____

e. _____ Non-applicable

8a. _____ One company only

8b. _____ Two or more companies

9. From what companies do you purchase your gasoline engines?

a. _____

b. _____

c. _____

d. _____

e. _____ Non-applicable

(CODE)

9a. _____ One company only

9b. _____ Two or more companies

10. What is your approximate average cost per truck, per year for mechanical, chassis and body maintenance?

_____

11. What is your most frequent type of repair?

_____

_____

12. Have you had complaints from your drivers and/or dispatchers regarding mechanical repair in any of the following areas?

a. Safety Yes _____ No _____

b. Quality of workmanship Yes _____ No _____

c. Consumer protection considerations (i.e., installation of unnecessary parts) Yes _____ No _____

d. excessive repair time Yes _____ No _____

13. Do we need separate exams for diesel and truck chassis?

a. _____ Yes

b. _____ No

14. If some modification in the present system of testing diesel and truck mechanics is necessary, which of the following options would you prefer?

a. _____ modify the existing examination

b. _____ develop a new test using generic items derived from items prepared by major manufacturers

c. _____ develop new tests for each major manufacturing firm from items provided by these firms

d. _____ develop both a written and practical/performance test which is generic in nature from items provided by dealers and service centers

e. _____ ask the Legislature to exempt diesel and truck mechanics from certification

15. If a new written examination(s) is to be developed what should be the relative emphasis on the following components?

	little or no importance			great importance	
a. transmission	1	2	3	4	5
b. axle	1	2	3	4	5
c. suspension/alignment	1	2	3	4	5
d. brakes	1	2	3	4	5
e. gasoline engines	1	2	3	4	5
f. diesel engines	1	2	3	4	5
g. drive train	1	2	3	4	5
h. electrical	1	2	3	4	5
i. air conditioning	1	2	3	4	5

15. If a new written examination(s) is to be developed what should be the relative emphasis on the following components?

	little or no importance			great importance	
a. transmission	1	2	3	4	5
b. axle	1	2	3	4	5
c. suspension/alignment	1	2	3	4	5
d. brakes	1	2	3	4	5
e. gasoline engines	1	2	3	4	5
f. diesel engines	1	2	3	4	5
g. drive train	1	2	3	4	5
h. electrical	1	2	3	4	5
i. air conditioning	1	2	3	4	5

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